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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/748,919	12/27/2000	Chikayoshi Kamata	0941.65074	5081

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EXAMINER

NGUYEN, DZUNG C

ART UNIT	PAPER NUMBER
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2652

DATE MAILED: 05/21/2003

12

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/748,919

Applicant(s)

KAMATA ET AL.

Examiner

Dzung C Nguyen

Art Unit

2652

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 24 March 2003.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-12 is/are pending in the application.
- 4a) Of the above claim(s) 8-12 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-7 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 3/24/03 has been entered.
2. Claims 1-12 are pending in this patent application.
3. Claims 1-7 are present for examination.

Claim Rejections - 35 U.S.C. § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 1-6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sato et al, US patent (6,342,993) in view of Chen et al, US patent (5,491,600).

Regarding claim 1, Sato et al teach a magneto-resistive magnetic sensor [fig 3], comprising: a magneto-resistive structure [6c] changing a resistance [6a] thereof in response to an external magnetic field (col.7 lines 7-10); a cap layer [6b], provided on a top surface of said magneto-resistive structure [6c (see fig 3); a pair of magnetic regions [overlapped regions of 8 and 6, fig 3] over both side of disposed at both lateral sides of said magneto-resistive structure [6c], said magnetic regions having a magnetization pointing in a common direction; a pair of electrodes [8] provided on said pair of magnetic regions so as to oppose with each other across said magneto-resistive structure [6c], said electrodes [8] having respective overhang parts [overlapped 6 and 8] extending over said magneto-resistive structure so as to oppose with each other with a gap [gap between 8] therebetween; said pair of electrodes [8] injecting a sensing current into said magnetoresistive structure [6c] primarily via top surface [surface or 6b] of said magnetoresistive structure [6c] (see fig 3).

Sato et al do not teach that an oxidation-resistant conductive layer is interposed between said cap layer and said overhang part.

Chen et al teach that an oxidation-resistant conductive layer [150, 130 or 110] is interposed between said cap layer [Ta, 165, 140, or 160] and said overhang part (see fig 8).

It would have been obvious to one of ordinary skill in the magnetic head art at the time the invention was made to have modified the magnetoresistive head of Sato et al by forming the oxidation-resistant conductive layer being interposed between said cap layer and said overhang part as taught by Chen et al because the modification would have maintained the resistance on the surface of the MR head (Chen et al, col. 240-43).

Regarding claim 2, Chen et al teach that the oxidation-resistant conductive layer is formed of a metal selected from the group consisting of Au (see fig 8).

Regarding claims 3-4, Chen do not teach that wherein said oxidation-resistant conductive layer has a thickness larger than about 1 nm (claim 3); wherein said oxidation-resistant conductive layer has a thickness of larger than about 3 nm (claim 4); wherein said oxidation-resistant conductive layer has a thickness of smaller than about 10 nm (claim 5).

It would have been obvious to one having ordinary skill in the art at the

time the invention was made to form the oxidation-resistant conductive layer has a thickness larger than about 1 nm (claim 3); wherein said oxidation-resistant conductive layer has a thickness of larger than about 3 nm (claim 4); wherein said oxidation-resistant conductive layer has a thickness of smaller than about 10 nm (claim 5) through routine lab experimentation and optimization to minimize surface of the topography of a MR head; thereby improving the density of the read/write magnetic head (see col. 2 lines 40-44).

Regarding claim 6, Sato et al teach that wherein said cap layer [6b] comprises Ta (see col. 7, lines 7-10).

6. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable Sato et al, US patent (6,342,993) in view of Chen et al, US patent (5,491,600) and further in view of Pinarbasi, US patent (5,883,764).

Regarding claim 7, Sato et al do not teach that the magneto-resistive structure comprises an anti-ferromagnetic pinning layer, a ferromagnetic pinned layer having an exchange coupling with said anti-ferromagnetic pinning layer, a ferromagnetic free layer, and a non-magnetic separation layer interposed between said ferromagnetic pinned layer and said ferromagnetic free layer.

Pinarbasi teaches that the magneto-resistive structure [fig 4] comprises an anti-ferromagnetic pinning layer [421], a ferromagnetic pinned layer [420] having an exchange coupling with said anti-ferromagnetic pinning layer [421], a ferromagnetic free layer [410], and a non-magnetic separation layer [415] (see col. Col. 5 lines 44-45) interposed between said ferromagnetic pinned layer [420] and said ferromagnetic free layer [410] (see fig 4).

It would have been obvious to one having ordinary skill in the magnetic head art at the time the invention was made to have modified to form the MR layer of Sato et al which is including: an anti-ferromagnetic pinning layer, a ferromagnetic pinned layer having an exchange coupling with said anti-ferromagnetic pinning layer, a ferromagnetic free layer, and a non-magnetic separation layer interposed between said ferromagnetic pinned layer and said ferromagnetic free layer as taught by Pinarbasi because the modification would improve the lead conductance of magnetic read/write head (see Pinarbasi col. col. 4 lines 14-15).

7. Applicant's arguments with respect to claims 1-7 have been considered but are moot in view of the new ground(s) of rejection.
8. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

- a. Chang et al , US patent (6,274,025).
 - b. Hayashi et al, US. Patent (6,341,052).
 - c. Hosomi et al, US patent (6,535,363).
 - d. Ju et al, US patent (6,228,276).
9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dzung Nguyen whose telephone number is (703) 305-9695. The examiner can normally be reached on Monday-Friday from 8:30 am to 6:00 pm.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Group receptionist whose telephone number is (703) 305-3900 and fax number is (703) 872-9314.

Dzung Nguyen

5/14/03


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5/16/03